



LUBRICATION SOLUTIONS TO MOVE FORWARD

High performance lubricants, cleaners and hardware are important to reduce the maintenance, energy costs and downtime of coal mining equipment, explains **Vladislav Milovanov, Interflon Russia.**

Heavily loaded equipment, extreme temperatures, exposure to water and dust contamination are the demanding operating conditions of the mining industry. Mine site operators have goals, such as reducing maintenance costs, increasing machine uptime, improving safety, energy savings and decreasing total cost of ownership. Interflon is a specialty lubricant company that helps organisations, among others in the mining industry, move forward in a constantly evolving world with innovative lubrication solutions. Skilled technical advisors assist mine engineers and maintenance staff onsite in optimising their processes and implementing the selected Interflon lubricants, converting them into real cost saving solutions. The result is a reduction in maintenance costs, power consumption and CO₂ emissions, whilst promoting component reliability, better machinery salvage costs and maximum mineral output.

Interflon has many mining customers around the world that have achieved these improvements using its integrated solutions: training, consultancy, staffing, maintenance software and hardware equipment. Combined with the company's unique MicPol® technology, these mine site operators reach their goals and the highest possible standards in safety, efficiency and emissions.

Maintenance software for managing operational maintenance and lubrication activities

Many coal engineers fight with reliability, high energy consumption and wear. With the Interflon Lubrication and Control (ILAC) maintenance software (lubricate), technical maintenance tasks can easily be performed, improved and logged. With ILAC Pro, even working together via mobile devices is possible, meaning that paper can be eliminated. Customised lubrication plans



Figure 1. Maintenance software program to deliver the precise and best lubrication practices.



Figure 2. Operating the Sandvik bolting machine attached to the road header deep underground.



Figure 3. Bucket wheel reclaimers need the best advanced lubricants to prevent costly failure.

are embedded in a handy and user-friendly software environment. Overall equipment efficiency is made possible by cost saving lubricants, combined with ILAC as a powerful tool for managing operational maintenance and lubrication activities. ILAC is being used for documenting maintenance work, automating lubrication and maintenance activities, effective planning and management, rationalising the number of lubricants, determining the most suitable lubricant per lubrication point, registration of deviations from machines, reporting of disruptions and timesheets, and so on. Control over machinery is guaranteed. Instead of reactive maintenance, preventive maintenance for coal engineers is possible.

Technology for lower friction

MicPol is Interflon's unique micronised and polarised technology. The solid lubrication particles in the Interflon products are micronised, meaning that they are reduced to a tiny diameter of between 0.05 - 15 μm . This is what allows them to penetrate even the tiniest crack, crevice and pores on the surface substrate. These cracks cannot be seen with the naked eye, but MicPol fills them and eliminates the resistance they would otherwise offer to anything moving over the surface. Next, the particles are polarised. This gives them a negative charge. When they connect with the positively charged surface of machines, they will bond creating a long-lasting solid lubrication film avoiding metal to metal contact. Traditional lubricants need to be fortified afterwards with all kind of ingredients to achieve adherence to the surface. These ingredients come along with all kind of negative properties. This solid layer of lubrication offers the lowest possible coefficient of friction, as low as 0.04. It also withstands great extremes of pressure and temperature. In general, the MicPol layer will last on surfaces up to 10 times longer than other lubricants. It also repels water, preventing corrosion, because without water there is no rust. The anti-adherent properties of the MicPol layer refuse particle adhesion, avoiding the creation of abrasive pastes, very common with conventional oil-based lubricants. This is a tremendous advantage for the mining industry, where humidity, dirt or other contaminants are a factor. Therefore, Interflon lubricants also protect.

Because Interflon products with MicPol reduce friction so much better than conventional oils and greases, the results are lower lubrication frequency of the machinery, less energy consumption and the machine parts last longer. And all this leads to less interventions and less downtime.

Applications in coal mines

Coal mines have saved as much as 15% in energy costs. Some applications have the potential to save more, depending upon certain operating conditions. Results vary and depend upon the type of machine, the load it

is required to carry and the efficiency of its design. Energy can be recovered, for instance, in gearboxes, chain drives, hydraulics and compressors.

Interflon's Grease MP2/3 – an acclaimed, multipurpose, heavy-duty grease with MicPol – has been chosen by many mine operators, as it has provided proven benefits in use in a range of coal mining applications. With this, extremely long-lasting protection against wear and corrosion is guaranteed.

One mine had experienced the failure of an impact hammer used in a crusher. The rotor failed due to dirt ingress and water bypassing the seal of the bearings, all of which had been greased to the OEM's stipulated regime with the recommended products. The crusher was also fitted with a remote greasing system, allowing regular purging and lubrication. The machine was expected to crush 5.6 million t of coal, but failed at 2.2 million t. Inspection revealed that the drive end bearing had seized due to mineral debris and water ingress, and the non-drive side bearing showed signs of premature failure. This failure resulted in four days' downtime, equating to US\$3.2 million of lost coal revenue, while the price of the replacement crusher bearings, including the rotor, amounted to some US\$134 000.

Since using Interflon's Grease MP2/3 in the bearings of the crusher, the machine has exceeded 6 million t throughput with no failures or issues. As well as offering a low friction coefficient, the Grease MP2/3 provides an ultra-thin polymer layer, which acts as a shock absorber, thus reducing vibration and increasing efficiency, reliability and longevity.

Air tools have also benefited from using it. HAVS tests of air tools show a significant difference, both in the increased torque of the tools and a 50% reduction in tool vibration. These findings are supported by independent testing organisations in different countries.

Longwall roof supports and shearer pins at all mining customers' operations have benefited from the use of Interflon Grease MP2/3. This is apparent when engineers need to salvage the equipment for use on another face development. Stripping down roof supports can be very difficult in a hostile mining environment: heavy equipment and cutting tools may have to be deployed to help the salvage team strip down the supports. The Interflon lubricant greatly assists this process: when the pins are pulled, they release time after time, saving many man hours and replacement pin costs.

All mining customers also reported improved performance following the use of dry film chain lubricant, Interflon Lube TF with MicPol, on the chains and slides of bolting machines. This has significantly extended the life of the chains, reducing the time required to redeploy to another heading and saving in operational costs.

Underground mines have also reduced energy costs

by adding Interflon Finnoly Additive T251 to their gearbox oil. They have reduced operating temperatures and improved the performance of such enclosed gear drives with outstanding stick-slip reduction. They experienced a very cost-effective method for dealing with reduction of friction, heat and wear. Their equipment is protected for a long time by temperature reduction, improved EP, longer oil life and demulsibility, and extended foam inhibition in the presence of water and contaminants. Additionally, the number of oil changes has been reduced, which has also reduced the maintenance costs.

Interflon has also improved the efficiency of the air lubricators of the coal skip winders. These were problematic due to water in compressed air freezing in winter temperatures. The valves would stick and this would lead to significant downtime, as the coal was not able to be wound from the shaft. After Interflon Lube PN46 – a high quality oil for pneumatic tools and linear drives – was used, this mining customer did not have any problems anymore with skip winding in winter. The reduction of lubricant fell from daily top-ups to weekly or every two weeks.

Lubricant analyses and lubrication plans

Uptime of machinery is key in the mining industry, and lubrication analysis provides essential information. Therefore, Interflon always first analyses the applications to select the right products and gives advice in which way, in what quantity and frequency they should be applied. The company's technical advisors consult with the mine engineer to choose the best product for the application. Every factor that is important for the coal mine, such as temperature, contaminants and load, are then taken into account.

After the selection of the products, maintenance staff or the machine operators who perform the maintenance task are then trained to get the maximum results out of Interflon's MicPol technology and how they should use the products. An explanation and instructions on how to clean properly is provided first. The company's lubrication experts help onsite with applications support, to ensure that the operators get the best from their products. The results are also documented and reported. Coal mines that have experienced Interflon's solutions have reported it has made their machines operate more reliably and more efficiently.

Conclusion

Interflon customers in the mining sector experience considerably lower lubrication labour costs and lubricant consumption rates. Operators are able to prolong the service life of their critical components, bringing downtime to a minimum, reducing power consumption and CO₂ emissions, as well as improving equipment utilisation rates and reliability at the same time. 